

Every list has the following interface:

Field Name	Data Type	Description
ListID	long	Primary Key for the table
TaskID	long	TaskID of the task associated with the list
PathID	long	PathID of the path associated with the list
ListName	string*50	Name of the list
ListDesc	string*25 5	Description of the list
ReferenceName	string*50	Name of the spreadsheet cell associated with the list
TutorAware	boolean	Whether the ICA should be notified of any changes to the list
TargetID	long	TargetID of the output
TotalColumns	long	Total number of data columns
Row	long	Spreadsheet row number of the output → speed optimization
Column	long	Spreadsheet column number of the output → speed optimization
SheetName	string*50	Sheet name where the input is located → speed optimization

Use of a list is demonstrated by continuing our math test. The math question in this example invites the user to select multiple elements to construct the answer. These are the steps required to configure that section of the simulation. Figure 26 illustrates the steps for configuring a simulation in accordance with a preferred embodiment. Define a name for cell C23 in Excel. Here we have defined "The_List". Let's use the same TaskID as before since Question 3 is part of the same simulation as Question 1 and 2. Ex: TaskID is 123. In the ICA, define a Target for the list. Ex: a TargetID of 4006 is generated by the ICA. In the ICA, define a SourceItem for every item that could be placed in the list. Ex: the following SourceItemIDs 1209, 1210, 1211, 1212, 1213, 1214 are generated by the ICA. Associate the list to a path (refer to Path object discussion). Add the information in the List table of the simulation engine database.

A record in the List table in accordance with a preferred embodiment is presented in the table appearing below.

ListID:	12346
TaskID:	123
PathID:	1234
ListName:	Question 3 list
ListDesc:	List for Question 3
ReferenceName:	The_List
TutorAware:	True

TargetID:	4006
TotalColumns:	1
Row:	23
Column:	3
SheetName:	Sheet1

All cells in the spreadsheet that are result of calculations (do not require any external input) can be represented by output objects. Every output has an interface as outlined in the table below.

Field Name	Data Type	Description
OutputID	long	Primary Key for the table
TaskID	long	TaskID of the task associated with the output
PathID	long	PathID of the path associated with the output
OutputName	string*50	Name of the output
OutputDesc	string*25 5	Description of the output
ReferenceName	string*50	Name of the spreadsheet cell associated with the output
TutorAware	boolean	Whether the ICA should be notified of any changes to the output
SourceItemID	long	SourceItemID of the output
TargetID	long	TargetID of the output
Row	long	Spreadsheet row number of the output → speed optimization
Column	long	Spreadsheet column number of the output → speed optimization
SheetName	string*50	Sheet name where the input is located → speed optimization

All this information is stored for every output in the Output table of the simulation database (ICASim.mdb). When designers construct their simulation model, they must be aware of the fact that there is only 1 type of Outputs : the Distinct Output. A Distinct Output consists of one and only one spreadsheet cell that contains a formula or a result of calculations. The existence of Output cells is the main reason to have a simulation model. If the cell is TutorAware, the ICA will be notified of any changes to the cell when all outputs are processed otherwise the ICA will be unaware of any changes. When the ICA is notified of a change two messages are in fact sent to the ICA: An ICANotifyDestroy message with the output information i.e., SourceItemID, TargetID and null as Attribute. This message is to advise the ICA to remove this information from its memory. An ICANotifyCreate message with the output information i.e., SourceItemID, TargetID, Attribute (cell numeric value) . This message

is to advise the ICA to add this information to its memory. As opposed to Distinct Inputs and Drag & Drop Inputs which notify the ICA on every change, Distinct Outputs are processed in batch just before asking the ICA for feedback. To notify the ICA of the total dollar amount of the items in the list. We definitely need a Distinct Output for that. The output will contain a sum formula. Define a name for cell C24 in Excel. Here we have defined "Distinct_Output". Let's use the same TaskID as before since Question 3 is part of the same simulation as Question 1 and 2. Ex: TaskID is 123. In the ICA, define a Target for the output. Ex: a TargetID of 4005 is generated by the ICA. In the ICA, define a SourceItem for the output. Ex: a SourceItemID of 1215 is generated by the ICA. Associate the output to a path (refer to Path object discussion). Add the information in the Output table of the simulation engine database.

A record in an Output table in accordance with a preferred embodiment is presented below.

OutputID:	12347
TaskID:	123
PathID:	1234
OutputName:	Question 3 output
OutputDesc:	Distinct Output for Question 3
ReferenceName:	Distinct_Output
TutorAware:	True
SourceItemID	1215
TargetID:	4005
Row:	24
Column:	6
SheetName:	Sheet1

Paths are used to divide a simulation model into sub-Simulations meaning that you can group certain inputs, outputs and lists together to form a coherent subset or path. Every path has the following interface:

Field Name	Data Type	Description
PathID	long	Primary Key for the table
TaskID	long	TaskID of the task associated with the path
PathNo	long	Numeric value associated to a path
PathName	string* 50	Name of the path
PathDesc	string* 255	Description of the path

All this information is stored for every path in the path table of the simulation database (ICASim.mdb).

The simulation engine is the interface between the model, the simulation database and the Intelligent Coaching Agent. The simulation engine is of interest to the designer so that he can understand the mechanics of it all. But it is the developer of